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 TO RUHHDNA/JOHN D STEWART ERSP MGR ENEWETAK ATOLL M I
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 RUHVAAA/USDOE W J STANLEY PASO HONO HI
 RUWJBUB/RICHARD POWELL EBERLINE INSTRUMENT CORP TWX 910-985-0678
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 ZEN/BERT FRIESEN DRI C/O DOE LAS VEGAS NV
 ZEN/JOHN TIPTON EG&G LAS VEGAS NV
 ZEN/USDOE ROGER RAY APO LAS VEGAS NV
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UNCLASSIFIED/N O N W D/NARR. SECTION 1 OF 3.

SUBJECT: DRAFT TECHNICAL PLAN FOR FISSION PRODUCT PROGRAM

1. FOLLOWING IS DRAFT NEXT OF A PLAN WE NEED TO HAVE IN THE MAIL

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MARCH 19, 1979. BAIR COMMITTEE MEETING TO REVIEW SUBJECT PROGRAM
 MARCH 27, 28, 1979 IN WASHINGTON, D.C. PLEASE PROVIDE COMMENTS,
 CHANGES, ETC. BEFORE COB FRIDAY, MARCH 16, 1979.

2. W. ROBISON AND ERSP MANAGER NEED TO ESTABLISH COORDINATED IDENTITY
 FOR THE BEGINNING POINT OF THE JANET 100 METER GRID BEFORE STARTING
 THE SAMPLE ANALYSIS--INITIAL ACTION REQUESTED TO W. ROBISON.

DRAFT TE

XT FOLLOWS:

I. INTRODUCTION

AT THE DECEMBER, 1978 MEETING ON ENEWETAK OF REPRESENTATIVES OF
 DOE, THE DRI/ENEWETAK AND OTHER GOVERNMENT OFFICIALS, A NUMBER

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OF QUESTIONS RELATING TO THE ISLAND USE AROSE. FOREMOST AMONG THEM WERE THE POSSIBILITY OF RESETTLEMENT OF JANET (ENJEBI) IN THE NEAR FUTURE, AND OF PLANTING COCONUTS ON THE NORTHERN ISLANDS. THEN-AVAILABLE DOSE ASSESSMENTS WERE NOT ADEQUATE TO DECIDE THESE ISSUES AND THE DOE REPRESENTATIVE COMMITTED TO THE PEOPLE A COMPLETE NEW ASSESSMENT FOR JANET BY MAY 31, 1979. THIS WAS LATER MODIFIED AT THE FEBRUARY 1979 ALBUQUERQUE MEETING TO INCLUDE THE SIX COCONUT ISLANDS WITH THE SAME DEADLINE. THE REMAINING NORTHERN ISLANDS ARE TO BE COMPLETED PRIOR TO OCTOBER 1, 1979. THE AVAILABLE DATA ARE INADEQUATE FOR THE TASK OF REASSESSMENT.

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PROFILE DATA TAKEN DURING THE 1972 SURVEY ARE TOO SPARSE FOR A GOOD ASSESSMENT, AND DO NOT REPRESENT THE POST-CLEANUP STATUS OF THE ATOLL. DATA TAKEN DURING THE CLEANUP HAVE PRIMARILY BEEN FROM THE SURFACE, AND THEREFORE ARE OF MINIMUM VALUE IN DETERMINING UPTAKE FROM THE ROOT ZONE. CLEANUP DATA IS ALSO ALMOST EXCLUSIVELY ON TRANSURANICS, WHICH CONTRIBUTE MUCH LESS TO DOSE THROUGH THE FOOD CHAIN THAN THE FISSION PRODUCTS CESIUM-137 (CS-137) AND STRONTIUM-90 (SR-90).

THE FISSION PRODUCTS SAMPLING EFFORT HAS BEEN UNDERTAKEN IN ORDER TO GENERATE A DATA BASE THAT CAN BE USED FOR COMPREHENSIVE DOSE ASSESSMENT WORK.

II. SAMPLING

LEROY AND ALL NORTHERN ISLANDS, EXCLUDING YVONNE (RUNIT) ARE TO BE PROFILE SAMPLED ON A 50 METER GRID. SAMPLING METHOD AND ANALYSIS OF SAMPLES WILL NOT DIFFER FROM ISLAND TO ISLAND EVEN THOUGH ISLAND USE HAS BEEN CATEGORIZED AS RESIDENTIAL, AGRICULTURAL OR FOOD GATHERING AND HAVE DIFFERENT CRITERA APPLICABLE.

A. ISLANDS INCLUDED

TABLE I LISTS LEROY AND ALL THE ISLANDS NORTH OF BUT EXCLUDING YVONNE. SHOWN ALSO IS THE APPROXIMATE NUMBER OF GRID POINTS ON

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EACH ISLAND BASED ON A 50 METER GRID. PROFILE HOLES WILL BE EXCAVATED TO APPROXIMATELY 100 CENTIMETERS OR TO CORAL OR TO WATER, WHICHEVER OCCURS FIRST.

TABLE 1. NUMBER OF FISSION PRODUCT PROFILES FOR THE NORTHERN ISLANDS OF ENEWETAK ATOLL

ISLAND	NO. POINTS ON 50 METER GRID
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LEROY	19
ALICE	29
BELLE	43
CLARA	10
DAISY	30
EDNA	8
IRENE	60
JANET	371
KATE	21
LUCY	28
PERCY	9
MARY	12
NANCY	15
OLIVE	56

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PEARL	74
RUBY	4
SALLY	153
TILDA	58
URSULA	100
VERA	54
WILMA	19
TOTAL POINTS	1173
	X 6
TOTAL SAMPLES	7038

B. GRIDS & DENSITY

SAMPLING PROFILE HOLES WILL BE EXCAVATED ON A 50 METER GRID AND SAMPLED AS OUTLINED IN SECTION II. C. 2. THIS DENSITY PATTERN WAS SELECTED FOR SEVERAL REASONS. FIRST, MOST OF THE ISLANDS ALREADY HAVE GRID LANES CUT AND STAKES PLACED ON A 50 METER BASIS. A FEW OF THE SMALLER ISLANDS HAD 2# METER GRIDS PLACED BUT NO ISLAND HAD A GRID INTERVAL GREATER THAN 50 METER. SECOND, THE LOGISTICS OF BACKHOE AND SOIL SAMPLING CREW SUPPORT ARE SUCH THAT A 50 METER SAMPLING GRID IS AS FEASIBLE AS ANY OTHER AND WILL SUPPLY A MORE DETAILED DATA BASE THAN WOULD A LARGER GRID. A LARGER GRID SPACING WOULD YIELD TOO FEW SAMPLES FROM THE SEVERAL SMALLER ISLANDS.

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LASTLY, A FINER GRID, SAY 25 METER, WOULD REQUIRE AN INORDINATE INCREASE IN SAMPLING EFFORT SINCE ACCESS TO THESE POINTS IS VERY DIFFICULT WITHOUT CLEARED GRID LANES.

ON JANET THE 50 METER SAMPLING IS REQUIRED BECAUSE OF THE HISTORY OF EVENTS THERE RESULTING IN A VERY INHOMOGENEOUS DISTRIBUTION OF RADIONUCLIDES AND THE RECENT SOIL REMOVAL ACTIVITIES. INITIAL ANALYSIS WILL BE DONE ON SAMPLES FROM A 100 METER GRID WITH 50 METER GRID DATA ADDED AS DEEMED NECESSARY IN AREAS OF HIGH VARIABILITY. FOR DOSE ASSESSMENT PURPOSES ISLAND AVERAGE CONCENTRATIONS OF RADIONUCLIDES IN SOIL WILL BE USED. ALL SAMPLES WILL REMAIN IN THE ENEWEATK SOIL LIBRARY FOR POSSIBLE FUTURE USE, AND EVENTUALLY BE HOUSED AT THE NTS. THE REMAINING SOIL OF THE SAMPLES SHIPPED TO EIC/ALBQ. ARE TO BE SHIPPED TO REECO FOR INCORPORATION INTO THE ENEWETAK ATOLL SOIL LIBRARY.

C. PROCEDURES

THIS PROCEDURE DETAILS A UNIFORM METHOD OF TAKING SOIL PROFILES FOR LAWRENCE LIVERMORE LABORATORY (LLL) DOSE ASSESSMENT OF THE FISSION PRODUCTS PRESENT ON ENEWETAK ATOLL.

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THE EBERLINE LABORATORY MANAGER IS RESPONSIBLE TO THE DOE/ERSP
PROJECT MANAGER FOR IMPLEMENTING THESE PROCEDURES TO ASSURE

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SOIL DATA QUANTITY EQUIVALENT TO THAT TAKEN BY LLL IN THE
PACIFIC ISLANDS PREVIOUSLY.

1. TOOLS & EQUIPMENT

A. ONE GALLON CANS WITH STANDARD SAMPLE ALUMINUM LABELS
AND LIDS (SIX PER PROFILE).

B. SCOOP, 11.5 CM DIAMETER WITH FLAT END.

C. ROUND POINT SHOVEL.

D. CHISEL PICK WITH HANDLE.

E. TAPE MEASURE OR CALIBRATED STICK MARKED IN CENTIMETERS -
100 CM LONG.

F. BACKHOE TO DIG 100 CM DEEP TRENCH.

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- G. SOIL SAMPLERS FIELD NOTE BOOK.
- H. SHORT POINTING TROWEL, WITH 5 CM X 5 CM DIAMOND-SHAPED POINT.
- I. PERSONNEL: ONE SAMPLER: ONE DATA LOGGER, AND ONE PACKER
- J. GLASS FILAMENT TAPE.
- 2. METHOD
 - A. OFFSET FROM SURVEY STAKE LOCATION AT LEAST 1.5 METER TO AVOID DISTURBING STAKE.

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- B. DIG TRENCH TO A DEPTH OF 100 CENTIMETERS MINIMUM UNLESS SOLID ROCK OR WATER IS ENCOUNTERED. HAVE BACKHOE OPERATOR USE CARE TO AVOID MAJOR DISTURBANCE OF THE SIDE WALL TO BE SAMPLED.
- C. USE SHOVEL TO SQUARE UP SIDE WALL TO BE SAMPLED TO AT LEAST 70 CENTIMETERS DEEP.
- D. STARTING AT TOP OF SOIL COLUMN TAKE SIX SAMPLES OF AT LEAST 3000 CC OF SOIL AT EACH OF THE FOLLOWING LEVELS: 0-5 CM, 5-10 CM, 10-15 CM, 15-25 CM, 25-40 CM, AND 40-60 CM. ADJUST AREA OF EACH LAYER TAKEN TO INCLUDE SUFFICIENT VOLUME FOR 3000 CC OF SAMPLE. TAKE CARE TO INCLUDE ALL ROCK LESS THAN THREE EIGHTHS INCH, ORGANIC MATERIAL AND ROOTS PRESENT IN LAYER. AS EACH LAYER IS TAKEN, EXPAND LEVEL AREA TO EXTEND 15 CM BEYOND THE EDGE OF NEXT AREA TO AVOID CROSS-CONTAMINATION OF NEXT LAYER DUE TO FALLING SIDE WALLS.
- E. TO ASSURE CORRECT SITE LOCATION USE AS CAN, DO NOT PREMARK CANS OR LABELS BEFORE ARRIVING AT SITE LOCATION.
- F. DATA LOGGER WILL BE RESPONSIBLE FOR MARKING LABELS WITH

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THE FOLLOWING SITE DATA: (EXAMPLE ENTRIES IN PARENTHESIS)

- I. ISLAND IDENTIFIER: (FU, FV)
- II. ISLAND STAKE LOCATION: (24N16)
- III. DATE OF SAMPLE: (2/4/79)
- IV. CM DEPTH: (0-5)
- V. SHORT NOTE OF SITE CONDITION: (RAINING, WATER LEVEL

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- 90 CM, ROCK AT 40 CM, ETC.).
- VI. SAMPLING CREW LEADERS' NAME: (J. DOE).
- VII. CAN NUMBER: (1 OF 6)
- G. DATA LOGGER WILL BE RESPONSIBLE FOR RECORDING IN SOIL SAMPLERS LOG ON A DAILY BASIS:
 - I. ISLANDS SAMPLED
 - II. STAKES SAMPLED
 - III. GENERAL NOTES ABOUT WEATHER AND CONDITIONS OF SITES
 - IV. DISPOSITION OF CANS SHIPPED TO ENEWETAK FOR PROCESSING.
 - V. NAMES OF SOIL SAMPLING CREW MEMBERS.
- H. DO NOT ALLOW BACKHOE OPERATOR TO GET MORE THAN FEW HOLES

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AHEAD OF SOIL SAMPLING TEAMS.

- I. ALL SAMPLES TAKEN WILL BE TRANSPORTED TO LABORATORY ON ENEWETAK FOR PROCESSING AS SOON AS POSSIBLE.

III. ANALYSIS

A. ON-SITE SAMPLE PREPARATION

AFTER SAMPLE COLLECTION ALL SAMPLES WILL HAVE SAMPLE PREPARATION COMPLETED ON-SITE IN THE LABORATORY AT ENEWETAK. THE SAMPLE PREPARATION WILL INCLUDE RECORDING ALL IMPORTANT INFORMATION SUCH AS LOCATION, DATE AND SAMPLE SIZE. SAMPLES ARE THEN SCREENED TO MEASURE APPROXIMATE ACTIVITY LEVELS PRIOR TO PROCESSING.

SAMPLE PROCESSING INCLUDES RECORDING WEIGHTS, DRYING, HOMOGENIZING AND BALL-MILLING.

B. ON-SITE ANALYSIS

PORTIONS OF THE SAMPLES ARE TRANSFERRED TO PROPER GEOMETRY FOR GAMMA COUNTING, ANALYZING FOR CESIUM 137 AND AMERICIUM 241. AFTER GAMMA COUNTING HAS BEEN COMPLETED, SAMPLES ARE TRANSFERRED TO A CONTAINER AND PREPARED FOR SHIPPING TO EIC/ALBQ. LABORATORY. THE SHIPPING CONTAINERS HAVE AN EIC PACKING LIST GIVING CROSS-REFERENCE OF EIC NO. TO ISLAND LOCATION IDENTIFICATION AND A HARD COPY OF GAMMA RESULTS

. PU/AM CHEMICAL

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ANALYSIS WILL BE DONE ON ISLAND AS LABORATORY LOAD PERMITS

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WORKING TO THE GOAL OF CHEMICAL ANALYSIS OF TEN PERCENT OF ALL CORES SAMPLED.

C. OFF-SITE ANALYSIS

ANALYSIS BY EIC IN THE ALBUQUERQUE LABORATORY WILL INCLUDE RUNNING CORAL SAMPLES FOR STRONTIUM 90 AND FOR PU/AM TEN PERCENT OF ALL CORES RECEIVED.

THE PROCEDURE ENCLOSED ASSUMES SECULAR EQUILIBRIUM OF STRONTIUM 90, Y-90 HAS BEEN ATTAINED. THE Y-90 IS SEPARATED AND USED TO QUANTIFY THE STRONTIUM 90. AMERICIUM AND PLUTONIUM ANALYSES OFF-SITE INCLUDE ISOLATION OF PU FROM AM AND ELECTRODEPOSITION. TRACERS WILL BE USED TO QUANTIFY PU, AM ACTIVITY BASED ON THE RATIO OF THE TRACER TO ISOTOPE OF INTEREST.

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IV. QUALITY CONTROL

A. INTERNAL

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QUALITY CONTROL - INTERNAL WILL INCLUDE A CHECK OF RESULTS RUN OF EACH SHIPMENT OF SAMPLES. IN EVERY SHIPMENT THAT IS RECEIVED, CALCIUM CARBONATE WILL BE USED TO SIMULATE THE CORAL SAMPLE MATRIX. A BLANK OF CaCO_3 WILL BE PROCESSED WITH EACH SET OF TWENTY-FIVE SAMPLES TO DETERMINE THE AMOUNT OF CROSS CONTAMINATION THAT MIGHT OCCUR. CALCIUM CARBONATE WILL ALSO BE USED TO PREPARE A SPIKE CONTAINING A KNOWN AMOUNT OF SR-90. IF THE RESULTS OF THE SPIKE DEVIATE FROM THE KNOWN CONCENTRATION BY MORE THAN PLUS OR MINUS 30%, THE ENTIRE BATCH OF SAMPLES PROCESSED WITH THAT SPIKE WILL BE REANALYZED.

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EACH SET OF SAMPLES WILL ALSO HAVE DUPLICATE SAMPLES (APPROX. 20%) PROCESSED TO CHECK FOR PRECISION. ONE SAMPLE OUT OF EVERY SHIPMENT WILL BE PROCESSED THROUGH THE LONG INGROWTH DETERMINATION OF SR-90 AND COMPARED TO THE 48 HOUR METHOD FOR DETERMINING SR-90. TEN PERCENT OF DUPLICATES WILL HAVE Y-88 USED TO MEASURE YTTRIUM YIELD AND WILL BE COMPARED TO YTTRIUM GRAVIMETRIC YIELD DETERMINATION. JANET STANDARD SOIL WILL BE PROCESSED WITH EACH SHIPMENT OF SAMPLES TO DETERMINE

THE ACCURACY OF THE RESULTS. ONE OUT OF EVERY 20 SAMPLES IS RECOUNTED TO VERIFY THE Y-90 DECAY.

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B. EXTERNAL

QUALITY CONTROL - EXTERNAL WILL BE BASED ON STANDARD SOIL SAMPLES WHICH WILL BE SENT OUT TO VARIOUS LABORATORIES SUCH AS EPA AND LIVERMORE. THE RESULTS OF THIS EXTERNAL QC PROGRAM WILL PROVIDE EIC VERIFICATION OF ITS INTERNAL QUALITY CONTROL PROGRAM.

OTHER RELATED EXTERNAL QUALITY CONTROL PROGRAMS WHICH EIC IS PARTICIPATING IN ARE THE EPA QUALITY CONTROL CROSS CHECK STANDARDS AND THE INTERNATIONAL ATOMIC ENERGY COMMISSION CROSS CHECK STANDARDS.

V. DATA FLOW

A. EIC FUNCTIONS

1. ON-ISLAND LABORATORY

ALL FISSION PRODUCT SAMPLES TAKEN WILL BE ENTERED INTO THE EIC RAD LABORATORY DATA BASE ON ENEWETAK DURING PROCESSING. THE REPORTED ANALYSIS AND RESULTS WILL INCLUDE AT LEAST THE FOLLOWING FOR EACH SAMPLE:

HEADER DATA: ISLAND, LOCATION, DATE AND HOUR OF SAMPLE, DEPTH, SAMPLE TYPE, 30 CHARACTERS OF MISC. INFORMATION

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WHICH WILL INCLUDE SAMPLE COLLECTION CIRCUMSTANCES, COLLECTORS' NAME, AND LABORATORY SAMPLE ID NUMBER.

GAMMA SPECTRUM: A 2048 CHANNEL SPECTRUM COVERING 40 - 1900 KEV WITH CALIBRATION DATA, DETECTOR GEOMETRY, AND LATEST BACKGROUND SPECTRUM FILE.

RESULTS: DATA BLOCK TO INCLUDE RESULTS OF WET CHEMISTRY

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ANALYSIS OF AM-241, PU-238, PU-239-240, SR-90, U-234, 235 AND U-238 WHEN PERFORMED ON SAMPLE. DATA FOR THE FISSION PRODUCT PROGRAM WILL BE SUBMITTED TO DRI THROUGH THE NORMAL PATH ON ISLAND AND WILL INCLUDE THE DATA HEADER, GAMMA SPECTRUM AND ANY OTHER ANALYSIS RESULTS RUN ON ISLAND. FOR THE INITIAL JANET PROGRAM ONLY THE HEADER AND SPECTRUM WILL BE ON THE DATA FILES SUBMITTED TO DRI. A COMPLETE HARD COPY OF GAMMA AND HEADER DATA IS RETAINED AT ENEWETAK IN CASE TRANSFER MEDIUM IS DAMAGED IN TRANSIT.

2. ALBUQUERQUE LABORATORY

DATA WILL BE REPORTED TO DRI FROM THE ALBU. LABORATORY ON HARD COPY REPORTS. THE REPORTS FROM EIC WILL INCLUDE THE ISLAND IDENTIFICATION, LOCATION, DATE AND CI/G (DRY)

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ACTIVITY OF RELEVANT ISOTOPES. EACH SHIPMENT RECEIVED FROM ENEWETAK WILL BE PROCESSED AND REPORTED OUT AS A BATCH. THE REPORT WILL ALSO INCLUDE RESULTS OF SPIKES, BLANKS, JANET STANDARD SOIL, AND DUPLICATE ANALYSIS.

B. DRI FUNCTIONS

DRI IS RESPONSIBLE FOR ASSEMBLING THE DATA FROM ENEWETAK AND ALBUQUERQUE AND ASSURING THAT ALL THE RESULTS FOR A PARTICULAR SAMPLE ARE PROPERLY ASSOCIATED. THE DATA WILL BE TRANSFERRED FROM DISK TO MAGNETIC TAPE, IN A FORMAT COMPATIBLE WITH THE CDC 6400, AS THEY ARRIVE IN LAS VEGAS.

THE DATA ON MAGNETIC TAPE WILL BE PROCESSED TO CONFORM WITH LLL REQUIREMENTS FOR MAKING THE DOSE ASSESSMENTS. THIS WILL INCLUDE GENERATING CROSS-REFERENCE LISTS RELATING EIC LAB NUMBER TO ISLAND LOCATION, AND A TABLE SHOWING SAMPLE DATA AND PERTINENT COMMENTS. IN ADDITION, SOME ISOTOPE VALUES MUST BE CORRECTED FOR ACTIVITY IN THE LOCAL ENVIRONMENT, USING LONG BACKGROUND COUNTS TAKEN BY THE ENEWETAK LAB. RESULTS OF THE QUALITY CONTROL EFFORTS WILL BE INCLUDED ON THE DATA BASE AS APPROPRIATE, AND DOCUMENTATION INCLUDED WITH THE DATA TRANSFERRED TO LLL. FINALLY, THE EIC DATA WILL BE CONVERTED FROM

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PCIO CURIES/G TO DPM/G AS REQUIRED BY LLL, AND THE RESULTS

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AND ERRORS PUNCHED ON CARDS IN THE LLL FORMAT. THESE CARDS WILL BE SHIPPED TO LLL FOR THE DOSE ASSESSMENTS. DRI WILL ALSO SHIP TO LLL DIRECTLY FROM ENEWETAK PRINTOUTS OF IMP SURFACE DATA FOR USE IN ASSESSING DOSE FROM INHALATION. THESE WILL BE THE LATEST POST-CLEANUP VALUES WHERE APPROPRIATE AND WILL INCLUDE THE FOLLOWING ISOTOPES: AMERICIUM-241, IN PICO CURIES/G; EUROPIUM-155, IN PICO CURIES/G; COBALT-60, IN MICRO ROENTGEN/HR; AND CESIUM-137, IN MICRO ROENTGEN/HR. THESE DATA WILL BE HARD COPY ONLY RATHER THAN ANY MAGNETIC MEDIUM.

C. DOSE ASSESSMENT

BILL ROBISON WILL USE THE PROFILE DATA FROM THIS PROGRAM, THE SURFACE IMP DATA, AND DIET MODEL DEVELOPED AND APPROVED BY THE DRI-ENEWETAK IN MAKING THE DOSE ASSESSMENT. LATEST AVAILABLE INFORMATION ON CONCENTRATION RATIOS AND UPTAKE BY RELEVANT PLANTS WILL BE INCLUDED. ALSO, VARIOUS SCENARIOS OF ISLAND USE, RESIDENCE LOCATION, COCONUT PLANTING LOCATIONS, ETC. WILL BE CONSIDERED. THE ULTIMATE RESULT IS EXPECTED TO BE A REALISTIC ASSESSMENT OF THE DOSE ASSOCIATED WITH VARIOUS REASONABLE POSSIBILITIES FOR LIVING PATTERNS OF THE ENEWETAK PEOPLE.

END OF MESSAGE OSD/RB:BWC-305

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